IMPACT OF POPULATION GROWTH ON UNEMPLOYMENT IN NIGERIA: A DYNAMIC OLS APPROACH

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ABSTRACT
This study investigates the relationship between population growth and unemployment in Nigeria from 1980 to 2022, drawing on the Demographic Transition Theory, Structural Unemployment Theory, and Endogenous Growth Theory as a theoretical framework. Employing a quantitative approach with Dynamic Ordinary Least Squares (DOLS) regression, the research analyzes time series data to explore the impact of population growth on unemployment. The results suggest that, within the specified period, reduction in population growth alone does not significantly affect the unemployment rate in Nigeria, emphasizing the intricate nature of labor market dynamics beyond demographic factors. The theoretical framework highlights the importance of addressing structural unemployment through targeted skill development, comprehensive education reforms, and investments in technology and innovation. Additionally, the study underscores the need for integrated demographic and labor market policies, emphasizing monitoring and evaluation for evidence-based policy adjustments. The findings contribute to a nuanced understanding of the Nigerian labor market, guiding policymakers toward multifaceted strategies for sustainable development and inclusive growth.

Keywords: *Population Growth, Unemployment, Dynamic Ordinary Least Squares (DOLS), Labor Market, Nigeria.*
JEL Codes: J64, J11, E24, O15, H52, O40.

1. INTRODUCTION
Nigeria, situated in West Africa and boasting over 200 million people by 2021, grapples with substantial challenges related to sustainable development and economic stability (World Bank, 2021). Rapid population growth in the country has given rise to heightened concerns about unemployment, placing considerable pressure on resources, infrastructure, and the labor market (NPC, 2021; United Nations, 2020). This pressing issue, particularly affecting the youth, has significant implications for social stability, poverty alleviation, and overall economic growth (CBN, 2022).

Recognizing the complexity of the link between population growth and unemployment, this research aims to shed light on this relationship, identify contributing factors to unemployment, and propose evidence-based recommendations for sustainable and inclusive economic development in Nigeria (Adebayo et al., 2019). As Nigeria's population continues to expand, concerns grow about the labor market's ability to generate sufficient job opportunities, particularly for the youth (NPC, 2021; World Population Review, 2022).

The main research problem centers on assessing the impact of population growth on unemployment in Nigeria. Despite economic growth efforts, the labor market struggles to absorb the increasing number of job seekers, leading to social and economic challenges (NBS,

2020; ILO, 2021). Vulnerable populations, such as the youth, face heightened risks of unemployment, hindering individual progress and contributing to broader developmental challenges (NBS, 2020).

This study recognizes the interplay of factors such as educational mismatches, skills gaps, inadequate infrastructure, and limited access to financial resources as exacerbating the unemployment problem (Adebayo et al., 2019). It aims to provide insights to guide policymakers in formulating effective strategies for sustainable economic growth and job creation, ultimately enhancing the overall well-being of the Nigerian population.

The research's primary objective is to conduct a comprehensive assessment of the impact of population growth on unemployment in Nigeria. This study holds significance for various stakeholders, informing policymakers about the complex relationship between population growth and unemployment. By identifying factors contributing to unemployment, the research contributes to evidence-based decision-making, fostering sustainable economic growth and social welfare in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptualization of Literature

The conceptualization of the literature for this study draws from foundational concepts of population growth and unemployment to provide a comprehensive understanding of their intricate connections. Population, a fundamental concept in demographic studies, involves the scientific examination of the dynamics, structure, and changes over time within a defined geographic area or community (Haub, 2016). It encompasses various components such as age distribution, gender composition, fertility rates, mortality rates, and migration patterns, collectively shaping the demographic profile of a population and offering insights into its characteristics and trends (United Nations, 2019; Lee, 2019). The global significance of population dynamics, including variations in size, growth rates, and age structures, contributes to diverse demographic landscapes with implications for geopolitical, economic, and resource distribution issues (United Nations, 2019). This foundational understanding serves as a crucial backdrop for exploring the nuanced connections between population growth and unemployment.

Unemployment, a central concern in the study, is intricately linked to population growth through complex interactions of demographic trends and labor market dynamics (Smith et al., 2019). The concept of unemployment, reflecting the percentage of the labor force actively seeking employment opportunities, is a key economic indicator and a reflection of the efficiency of labor markets (Blanchard & Fischer, 1989). The multifaceted nature of unemployment, encompassing structural, frictional, and cyclical forms, highlights its complex causes and implications. This study recognizes the demographic dividend as a potential economic boost when a country's age structure shifts towards a larger working-age population but emphasizes the need for strategic efforts to harness the skills and productivity of the growing youth population in Nigeria to avoid it becoming a demographic burden (Bloom et al., 2014). Moreover, the demographic transition, marked by shifts in mortality and fertility rates, influences the age structure and labor force, requiring a nuanced understanding of its implications for employment patterns and policy formulation (Canning & Schultz, 2012). This conceptual framework provides the basis for exploring the complexities of Nigeria's demographic landscape and labor market, setting the stage for a nuanced exploration of the research problem and the development of effective policies.

2.2 Theoretical Literature

The theoretical framework for this study integrates the Demographic Transition Theory, Structural Unemployment Theory, and Endogenous Growth Theory to comprehensively analyze the relationship between population growth, unemployment, and economic development in Nigeria. The Demographic Transition Theory, as applied to Nigeria, underscores the ongoing shift in birth and death rates, signaling a transition from high to lower rates. This demographic shift, particularly evident in urban areas and among educated women, has implications for economic growth. If accompanied by effective policies, the transition can lead to a demographic dividend, offering the potential for increased productivity and economic growth due to a larger working-age population. However, the theory also warns of challenges, emphasizing that a rapid demographic transition without corresponding economic opportunities may result in a youth bulge with high unemployment rates, potentially leading to social unrest and economic instability (Uthman, 2017, 2018, 2019). Therefore, comprehensive policies aligning with the changing demographic structure are crucial for harnessing benefits and mitigating associated challenges.

Structural Unemployment Theory is integrated to address Nigeria's unemployment challenges resulting from a significant skills gap in its labor force. The theory emphasizes the importance of aligning the skills possessed by job seekers with the demands of the job market. Nigeria's structural issues in its education system contribute to prolonged unemployment for individuals due to this skills mismatch. The implications of structural unemployment extend to reduced productivity and efficiency in various industries. To address this, substantial investments in education and skills development are essential, with policies focused on improving the quality and relevance of education to enhance the employability of the workforce and foster economic growth (Ohwofasa, 2018).

Furthermore, this study incorporates Endogenous Growth Theory, emphasizing internal factors such as human capital and technological progress as drivers of economic growth in Nigeria. Investments in education, skill development, and innovation are identified as crucial for harnessing the demographic dividend. Policies targeting the improvement of education quality, vocational training, and technological advancements align with the principles of endogenous growth. This theory highlights the role of technological progress and the potential for Nigeria to foster economic growth by investing in research and development, promoting innovation, and adopting advanced technologies across sectors (Aghion & Howitt, 2009; Rodrik, 2016). Policies encouraging collaboration between industries and research institutions can lead to innovations benefiting the broader economy and contribute to inclusive development, ensuring that the benefits of economic growth are widely shared (Odedokun, 2016). The integrated theoretical framework provides a comprehensive basis for examining the complex interplay of demographic transition, structural unemployment, and endogenous growth in the Nigerian context.

2.3 Empirical Literature

The existing literature highlights the direct relationship between population growth and unemployment, emphasizing that an increase in population contributes to a growing labor supply (World Bank, 2021). This review explores research on the population growth-unemployment nexus in Nigeria, identifying gaps and providing a foundation for the current study's focus (Adebayo et al., 2019). Nigeria's demographic trends reveal rapid population growth influenced by declining mortality rates and increased life expectancy (United Nations, 2020). This demographic landscape, characterized by high birth rates, contributes to Nigeria's status as a crucial case study for understanding the economic implications of rapid population growth (NPC, 2021; World Bank, 2021).

Globally, Nigeria is poised to become the third most populated country by 2050, with a growth rate of 3.75% per year (United Nations, 2021). Factors such as fertility rates, declining mortality rates, and migration contribute to this growth, shaping population dynamics in specific regions and countries (Smith & Johnson, 2018; Garcia & Lee, 2019; Chen & Patel, 2020). The economic implications of population growth are multifaceted, influencing labor force size, innovation, and resource demand (Turner et al., 2016; Kim & Wu, 2017). However, unmanaged growth can strain resources, lead to unemployment, and pose environmental challenges (Turner et al., 2016).

Unemployment in Nigeria, particularly among the youth, is a persistent challenge with complex economic and social implications (NBS, 2018). External economic shocks, such as declining oil prices, contribute to the unemployment challenge, emphasizing the need for comprehensive strategies (Oyinlola, 2019; Imiosi et al., 2017). The inadequacy of economic growth to absorb the expanding labor force exacerbates unemployment, and a skills gap, limited access to infrastructure, and inadequate education-industry alignment further contribute to the problem (Ogwumike & Edun, 2017; Bakare, 2016).

The government's efforts to address unemployment in Nigeria are multifaceted, encompassing policies and interventions focused on education, skills development, entrepreneurship, and job creation. These initiatives aim to assess their effectiveness and impact on employment outcomes, particularly among the youth (Blanchard & Fischer, 1989; Carnevale et al., 2019).

Various policy instruments, such as fiscal and monetary policies, labor market reforms, and active labor market policies, are employed to manage unemployment and foster a smoother transition between jobs (Blanchard & Fischer, 1989; Carnevale et al., 2019). The effectiveness of these policies is crucial in a country like Nigeria, which has implemented numerous programs to address unemployment, with a specific focus on the youth population.

The literature review extends beyond Nigeria to explore similar challenges and interventions in other countries. Studies on Pakistan, South Africa, Kosovo, and Iran provide insights into the determinants of unemployment, the impact of economic growth, and the role of inflation on unemployment (Bhally et al., 2013; Banda et al., 2016; Laku & Deda, 2013; Mohsenia & Jouzaryan, 2016). These studies employ various methodologies, including the ARDL Model and the Vector Error Correction model, to analyze the complex relationships between economic variables and unemployment.

In the Nigerian context, research by Imiosi et al. (2017) emphasizes the significant effects of unemployment, population, and the labor force on economic growth, calling for interventions such as job creation, subsidies for private sector employers, and labor market regulation. Adekola et al. (2016) compare population and unemployment structures in Nigeria, China, and the USA, revealing a growing trend in both factors for Nigeria. Imiosi et al. (2014) explore factors contributing to unemployment in Nigeria, including rural-urban migration, government policies, skills gaps, and corruption, offering recommendations such as reviewing socio-economic organizations and promoting public-private partnerships.

Onyeoma (2020) studied the influence of the rising population on Poverty and Unemployment in Nigeria using Autoregressive Distributed Lag Bounds (ARDL) approach on annual data from 1980-2018. It explores the dynamic relationship between population growth and selected macroeconomic variables of economic growth, poverty, and unemployment as well as the direction of causality between them. The study also found that population growth and its components exerted a negative impact on the overall economic conditions in Nigeria.

Additionally, studies on historical interventions by the Nigerian government (Ayoade & Agwu, 2016) and the impact of unemployment and inflation on economic performance (Ademola & Badiru, 2016) highlight the challenges of corruption, bureaucratic hindrances, inconsistencies in government policies, and the need for well-designed macroeconomic policies. The research underscores the importance of reducing income inequalities and implementing policies to bolster domestic industries for sustained economic growth.

Finally, Maijama'a et al. (2019) focus specifically on the influence of population growth on unemployment in Nigeria, utilizing the Dynamic Ordinary Least Squares (DOLS) method for model estimation. Their findings reveal a positive impact of population and exchange rate on unemployment, emphasizing the need for comprehensive strategies to address the complexities of population dynamics and unemployment.

2.4 Gaps in Literature and Value Addition

In summary, the literature provides a rich array of insights into the challenges of unemployment in Nigeria and the diverse strategies and policies employed by the government to address this issue. The studies also emphasize the interconnectedness of economic variables and the need for holistic approaches to foster sustainable economic growth and reduce unemployment rates. However, the existing gaps in the reviewed literatures are the motivation for this current study to fill. Most studies emphasize a direct relationship between population growth and unemployment but often overlook the multifaceted causes of unemployment, including skills mismatch, government expenditure, and GDP growth rate. This study fills this gap by incorporating a broader range of variables such as educational attainment, skills mismatch, government expenditure, and GDP growth rate to provide a more holistic understanding of the factors influencing unemployment in Nigeria.

Additionally, while some existing studies employ basic econometric models, this study uses advanced models like Dynamic Ordinary Least Squares (DOLS) to provide more robust and reliable estimates, addressing potential biases present in previous analyses. Furthermore, many studies focus on cross-sectional data or shorter time periods, which may not capture long-term trends. This study, however, covers an extended period (1980-2022), allowing for a comprehensive examination of the long-term dynamics between population growth and unemployment.

3. METHODOLOGY

The research design's choice of utilizing a quantitative approach and specifically employing the Dynamic Ordinary Least Squares (DOLS) regression for this study is notable and has its own set of justifications.

Firstly, the adoption of a quantitative approach signals an intention to gather numerical data and conduct statistical analyses, offering a structured and systematic way to investigate the relationships between population growth and unemployment in Nigeria. A quantitative approach is well-suited for examining large datasets and identifying patterns, trends, and statistical significance, which is essential when dealing with complex economic and demographic variables (Woodridge, 2016).

The selection of the DOLS regression technique further aligns with the research objective of examining the impact of population growth on unemployment over time, between 1980 and 2022. Dynamic Ordinary Least Squares is particularly useful in handling time series data, where observations are collected at multiple points over a continuous period (Woodridge, 2016). DOLS addresses potential endogeneity concerns and allows for lagged variables, capturing the dynamic nature of economic phenomena and providing more robust estimates.

This is crucial when exploring the long-term relationships between population growth and unemployment, as lagged effects and cumulative impacts might be essential for a comprehensive understanding (Greene, 2012).

Moreover, the DOLS regression method allows for the identification of potential causal relationships. By employing lagged variables, DOLS helps to establish the direction of causality between population growth and unemployment, contributing to a more nuanced interpretation of the study's findings. This is crucial in policy research, where identifying causal relationships is essential for formulating effective interventions and recommendations (Chatfield, 2019).

3.1 Theoretical Framework

This study is grounded in several economic theories that help to understand the relationship between population growth and unemployment. Key theories include: Demographic Transition Theory; Structural Unemployment Theory; and Endogenous Growth Theory.

The study's model is built on the relationships suggested by these theories, incorporating a range of variables to capture the multifaceted causes of unemployment. Therefore, modeling the unemployment rate as the dependent variable and population growth as the independent variable using dynamic OLS estimation is expressed as follows:

$$Y_t = \alpha + \beta_1 X_1 + \sum_{j-q}^{j-r} \delta \Delta X_{t-j} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textit{(eqn 1)}$$

Following the Stock and Watson (1993) DOLS assumptions that adding the q lags and r leads of the differenced regressors soaks up all of the long-run correlation between the error terms.

Therefore, to formulate the above model using one lead and one lag, we will have the following:

$$Y_t = \alpha + \beta_0 X_{t-1} + \beta_1 \Delta X_1 + \beta_2 \Delta X_2 + \beta_3 \Delta X_3 + \beta_4 \Delta X_4 + \beta_5 \Delta X_5 + \sum_{j-q}^{j-r} \delta \Delta X_{t-j} + \delta_1 \Delta X_{1t-1} +$$

$$\delta_2 \Delta X_{2t-1} + \delta_3 \Delta X_{3t-1} + \delta_4 \Delta X_{4t-1} + \delta_5 \Delta X_{5t-1} + \varepsilon_t + \eta_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textit{(eqn 2)}$$

Thus:

$$Y_t = \alpha + \beta_0 X_{t-1} + \beta_1 \Delta X_1 + \beta_2 \Delta X_2 + \beta_3 \Delta X_3 + \beta_4 \Delta X_4 + \beta_5 \Delta X_5 +$$

$$\sum_{i=1}^{p} \theta_i \Delta Y t_{t-1} + \sum_{i=0}^{q} \phi_i \Delta X_{1t-1} + \sum_{i=0}^{r} \psi_i \Delta X_{2t-1} + \sum_{i=0}^{s} \xi_i \Delta X_{3t-1} + \sum_{i=0}^{t} \rho_i \Delta X_{3t-1} + \sum_{i=0}^{u} \sigma_i \Delta X_{3t-1} +$$
$$\varepsilon_t + \eta_t \ldots\ldots\text{-}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textit{(eqn 3)}$$

The Stock Watson method is, by contrast, a robust single equation approach which corrects for regressor endogeneity by the inclusion of leads and lags of first differences of the regressors, and for serially correlated errors by a GLS procedure. In addition, it has the same asymptotic optimality properties as the Johansen distribution. The method has been applied to the estimation of Chinese coal demand (Masih & Masih, 1996a), and the demand for energy in Jordan (Al-Azzam & Hawdon, 1999).

$$Q_t = X_t M'' + \sum_{i=-m}^{i=m} \phi_i \Delta P_{t-i} + \sum_{i=-n}^{i=n} \psi_i \Delta Y_{t-i} + \sum_{i=-l}^{i=l} \theta_i \Delta A_{t-i} + \varepsilon_t \ldots\ldots\ldots\text{-}\ldots\ldots\ldots \textit{(eqn 4)}$$

Where;

M = [c, α, β, γ], X = [l, P, Y, A]

and m, n and l are the lengths of leads and lags of the regressors. Suppose that Q has been found to be I(1) and at least some of the RHS variables I(1) or I(0), then DOLS estimates are obtained by regression analysis of the above equation (Al-Azzam & Hawdom, 1999).

We adapt and extend their approach (in eqn 4) here, and we model the unemployment rate in Nigeria as:

$$UR_t = \alpha + \beta_0 UR_{t-1} + \beta_1 \Delta PG_t + \beta_2 \Delta EA_t + \beta_3 \Delta SM_t + \beta_4 \Delta GS_t + \beta_5 \Delta GDPG_t + \sum_{i=1}^{p} \theta_i \Delta UR_{t-1} + \sum_{i=0}^{q} \phi_i \Delta PG_{t-1} + \sum_{i=0}^{r} \psi_i \Delta EA_{t-1} + \sum_{i=0}^{s} \xi_i \Delta SM_{t-1} + \sum_{i=0}^{t} \rho_i \Delta GS_{t-1} + \sum_{i=0}^{u} \sigma_i \Delta GDPG_{t-1} + \varepsilon_t + \eta_t \quad \text{.....(eqn 5)}$$

In this model, the subscripts "*t" and "*(t-1)" denote the current time period and the lagged value, respectively. The variables used are as follows:

UR_t represents Unemployment Rate at time t.

UR_{t-1} represents lagged Unemployment Rate at time t-1.

PG_t represents Population Growth at time t.

EA_t represents Educational Attainment at time t.

SM_t represents Skills Mismatch at time t.

GS_t represents Government Spending at time t.

$GDPG_t$ represents GDP Growth Rate at time t.

ε_t and η_t represent the rrror terms for short-run and long-run equations, respectively.

The short-run dynamics capture the immediate effects of the variables, while the long-run dynamics capture the equilibrium relationship between the variables.

A Priori expectations:

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0$

Where;

β_1 to β_5 represent the slope coefficients,

α is the intercept,

ϵ_t *and* η_t are the stochastic terms or the error terms at time t.

The Dynamic OLS (DOLS) model estimation allows for the investigation of the relationship between Unemployment and Population Growth in Nigeria while accounting for the lagged effects of the variables.

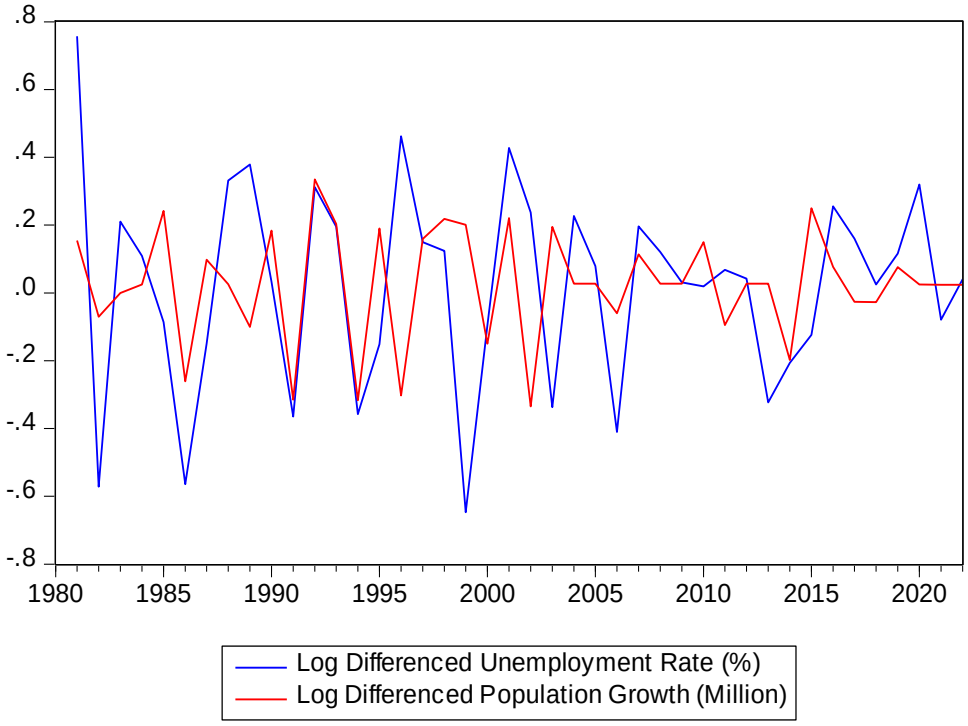
This model allows for the examination of the short-run and long-run effects of population growth, educational attainment, skills mismatch, government spending, and GDP growth rate on the unemployment rate in Nigeria. It provides a more comprehensive analysis by considering additional factors that may influence unemployment dynamics.

4. RESULTS AND DISCUSSIONS OF FINDINGS

4.1 Trend Analysis

The trend analysis highlights the seasonal movements and trends of population growth with respect to the behavior and pattern over the years.

Figure 1: Unemployment Rate and Population Growth Trend



Source: *Authors' Computation with E-Views 10; January, 2024.*

The trend analysis for unemployment rate and population growth in figure 1 above indicates that unemployment rate in Nigeria has exhibited fluctuations over the years. From 1980 to the early 1990s, there's a general pattern of modest increases, suggesting a gradual rise in unemployment. The period from the mid-1990s to the early 2000s sees variations, with some years experiencing a decrease. Post-2005, the trend generally shows an increasing trajectory, with a few fluctuations.

The data suggests a relatively stable unemployment rate during the early 1980s. The mid-1990s show a dip in the unemployment rate, possibly influenced by economic policies or external factors. Post-2005, there was a consistent rise in unemployment, reflecting challenges in job creation and economic stability. Economic events or policy shifts during this period might have contributed. Post-2015, the unemployment rate remains elevated, indicating persistent issues in the labor market.

On the other hand, the population growth in Nigeria has been on a consistent upward trajectory over the years. In the early 1980s to 2000s, the population growth rate remains relatively steady, reflecting natural demographic changes and possibly influenced by factors like improved healthcare and declining mortality rates. But post-2015, the population growth rate continues to rise, indicating sustained demographic expansion. The simultaneous increase in both population growth and unemployment rate from 2015 onwards suggests a potential correlation. The challenge for policymakers is to address the unemployment issue in tandem with the country's growing population.

4.2 Descriptive Statistics and Analysis

Additionally, we delve into a comprehensive examination of essential statistical measures that summarize and elucidate the key characteristics of a dataset. These measures include the mean, standard deviation, minimum and maximum values, and other statistical parameters.

Table 1: Summary of Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
UR	43	21.07481	5.990318	9.570000	34.85000
PG	43	1.32E+08	44945366	71685360	2.19E+08
EA	43	64.29279	9.138142	44.76000	78.14000
SM	43	52.81140	10.60453	34.92000	73.24000
GE	43	833.2451	1372.294	4.100100	6335.585
GDPGR	43	3.073409	5.258722	-13.12790	15.32920

Source: *Authors' Computation with E-Views 10; January, 2024.*

Table 1 provides a summary of descriptive statistics for the variables under consideration in the study, namely UR (Unemployment Rate), PG (Population growth), EA (Educational Attainment), SM (Skills Mismatch), GE (Government Expenditure), and GDPPR (GDP Per Capita). These statistics offer insights into the central tendency, variability, and range of the data as discussed below.

The mean of unemployment rate is approximately 21.07%, with observations ranging from a minimum of 9.57% to a maximum of 34.85%. The standard deviation of 5.99 indicates the dispersion of unemployment rates around the mean. The mean of population growth is approximately 1.32E+08, with a standard deviation of 4.49E+07. Observations range from a minimum of 7.17E+07, to a maximum of 2.19E+08. This indicates considerable variability in population growth. The mean of educational attainment is approximately 64.29%, with a standard deviation of 9.14%. The range of educational attainment is from a minimum of 44.76% to a maximum of 78.14%. This indicates moderate variability in educational attainment levels.

The skills mismatch has a mean of approximately 52.81. The minimum skills mismatch observed is 34.92, while the maximum is 73.24. The standard deviation of 10.60 indicates moderate variability in skills mismatch across the sample. Whereas the mean government expenditure is approximately 833.25. The range of government expenditure is from a minimum of 4.10 to a maximum of 6335.59. The standard deviation of 1372.29 indicates considerable variability in government expenditure. While the mean of GDP growth rate is approximately 3.07%. The range of GDP growth rate is from a minimum of -13.13% to a maximum of 15.33%. The standard deviation of 5.26 indicates considerable variability in GDP growth rates.

Overall, these statistics provide a snapshot of the central tendency, variability, and distributional characteristics of the variables under consideration, offering valuable insights for further analysis and interpretation.

4.3 Unit Root Test

In statistical analysis, a unit root test assesses whether a time series variable is non-stationary and exhibits a unit root. Non-stationarity is indicated by the presence of unit roots. If the p-value of z(t) is not significant, it suggests that the series lacks stationarity. Rejecting the null

hypothesis (H_0) that the series possesses a unit root occurs when z is less than or equal to 0.05 ($z \leq 0.05$). Conversely, if there are no unit roots, we infer that the series is stationary.

Table 2: ADF Unit Root Test

Variable	Test Stat.	Critical Value @5%	P. Value	Integration Rank
D(UR)	-3.437040	-2.933158	0.0151	I(0)
D(PG)	-11.19333	-2.935001	0.0000	I(0)
D(EA)	-4.356556	-2.943427	0.0014	I(1)
D(SM)	-6.465481	-2.941145	0.0000	I(1)
D(GE)	- 4.758036	-2.954021	0.0022	I(0)
D(GDPGR)	-12.08958	-2.935001	0.0000	I(1)

Source: *Authors' Computation with Eviews 10; January, 2024.*

In the new current developments in time series modeling, unit root tests of the time series properties of the data are studied to ascertain the order of integration of the variables used in the model. A series is said to be stationary at level if the null hypothesis is accepted, otherwise reject the stationarity test at level and proceed to the first difference. The Augmented Dickey Fuller unit root test was carried out, and the results presented in Table 4.2 clearly revealed that Unemployment Rate, and Population Growth became stationary at level difference.

4.4 Dynamic Least Squares (DOLS) Estimates

In this section, we delve into the application of DOLS modeling technique, providing insights into the estimation of short-run and long-run relationships between the variables under study.

Table 3: Dynamic Least Squares (DOLS) Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PG	-7.93E-08	1.10E-07	-0.718291	0.4813
EA	-0.141033	0.256882	-0.549019	0.5894
SM	0.517408	0.580727	0.890966	0.3841
GE	0.003016	0.002921	1.032338	0.3149
GDPGR	0.162486	0.413749	0.392716	0.6989
C	9.506339	21.80598	0.435951	0.6678
@TREND	0.226483	0.375512	0.603132	0.5504

R-squared	0.538292	Mean dependent var	20.80993
Adjusted R-squared	0.052284	S.D. dependent var	5.642621
S.E. of regression	5.493130	Sum squared resid	573.3151
Long-run variance	48.34431		

Source: *Authors' Computation with Eviews 10; January, 2024.*

The regression results indicate the estimated relationship between the unemployment rate and population growth, educational attainment, skills mismatch, government expenditure, GDP growth rate in Nigeria using the Dynamic Ordinary Least Squares (DOLS) method.

The coefficient for population growth is negative (-7.93E-08), but the t-statistic (-0.718291) suggests that it is not statistically significant at conventional levels (p-value = 0.4813). This indicates that changes in population growth do not have a significant impact on the unemployment rate. The coefficient for educational attainment is negative (-0.141033), but the t-statistic (-0.549019) indicates that it is not statistically significant (p-value = 0.5894). This suggests that the level of educational attainment does not have a significant effect on unemployment. The coefficient for skills mismatch is positive (0.517408), but the t-statistic (0.890966) suggests that it is not statistically significant (p-value = 0.3841). This implies that the degree of skills mismatch in the labor market does not significantly influence unemployment.

The coefficient for government expenditure is positive (0.003016), but the t-statistic (1.032338) indicates that it is not statistically significant (p-value = 0.3149). This suggests that government expenditure does not have a significant impact on unemployment. The coefficient for GDP growth rate is positive (0.162486), but the t-statistic (0.392716) suggests that it is not statistically significant (p-value = 0.6989). This indicates that changes in GDP growth rate do not have a significant effect on the unemployment rate.

Overall, the adjusted R-squared value (0.052284) indicates that the model explains only a small portion of the variation in the unemployment rate. Additionally, none of the independent variables are statistically significant predictors of unemployment in this model, suggesting that other factors not included in the model may have a stronger influence on unemployment in the context of this study. In view of this, further exploration and refinement of the model may be needed to better capture the complexities of the relationship between population growth and unemployment in the Nigerian context.

4.5 Post-Diagnostic Tests

Table 4: Post-diagnostic Tests

Problem	Post Estimation Tests	Prob.
Serial Correlation	Breusch-Godfrey Serial Correlation LM Test	0.1634
Heteroscedasticity	Breusch-Pagan-Godfrey Test	0.2924

Source: *Authors' Computation with Eviews 10; January, 2024.*

The post-diagnostic estimation tests are conducted to assess the reliability of our results. As shown in Table 4, we accepted the null hypothesis indicating the absence of serial correlation in our model, given the probability value of 0.1634, which exceeded the 5% level of significance. Consequently, our model was deemed robust and trustworthy. Furthermore, in the results of the heteroscedasticity test displayed in the same table, we unequivocally rejected the presence of heteroscedasticity based on the probability value of 0.2924. This reinforces the reliability of our model and affirms its suitability for further analysis.

4.6 Discussion of Key Findings in line with other Findings

The findings of this study on the relationship between unemployment and various factors align with existing research both locally and globally. Regarding population growth, the statistically insignificant coefficient mirrors similar studies such as Anuforo and Anuolam's (2014) work, indicating that population growth alone does not substantially impact changes in

unemployment rates. This finding is consistent with the findings of Onyeoma (2020), and Orumie (2016) cited in Ochinyabo (2021). Similarly, the lack of a significant coefficient for educational attainment resonates with Olaniyan and Okemakinde's (2008) findings, emphasizing the importance of factors beyond education in reducing unemployment, such as job availability and skills matching.

The non-significant coefficient for skills mismatch in this study aligns with research by Oyefunke et al. (2017), suggesting that while skills mismatch is a concern, it may not be the primary driver of unemployment rates. Additionally, the finding of a non-significant coefficient for government expenditure and unemployment is consistent with studies like Nwogbo et al., (2023); Ogbonna and Okoro's (2019) investigations, indicating that government spending alone may not effectively address unemployment challenges.

Furthermore, the lack of a significant impact of GDP growth rate on unemployment aligns with Awoyemi and Olorunshola's (2007) research, highlighting that economic growth does not always directly translate into reduced unemployment rates. These findings collectively underscore the complexity of factors influencing unemployment and emphasize the necessity of adopting multifaceted approaches and policies to tackle unemployment challenges effectively.

4.7 The Implication of the Results in line with Economic Theories

The regression results indicate that the coefficient for population growth is negative (-7.93E-08) and statistically insignificant at conventional levels (t-Statistic: -0.718291, Prob: 0.4813). This indicates that changes in population growth do not have a significant impact on the unemployment rate in Nigeria, at least within the specified time frame (1980-2022). The regression results of this study reveal that the coefficient for population growth is negative and statistically insignificant, indicating that changes in population growth do not significantly impact the unemployment rate in Nigeria within the specified time frame. These findings align with previous studies both locally and globally, showcasing the nuanced relationship between population growth and unemployment. Some local studies in Nigeria, such as Ogwumike & Edun (2017) and Ademola & Badiru (2016), have also found limited influence of population growth on unemployment, highlighting the role of other factors like economic policies and skills mismatches.

Globally, studies have shown diverse outcomes regarding the impact of population growth on unemployment, suggesting a context-dependent relationship influenced by economic, social, and political factors. Economic theories like structural unemployment theory and endogenous growth theory emphasize the multifaceted nature of unemployment, acknowledging demographic factors as just one component. The implications of these findings underscore the need for comprehensive policy interventions beyond population growth reduction alone. Addressing structural issues in the labor market, improving education and skills development, and implementing targeted economic policies are crucial for combating unemployment effectively in Nigeria. These recommendations align with economic theories that emphasize holistic strategies for sustainable economic development.

Regarding the Demographic Transition Theory, the study suggests that the reduction in population growth may not have reached a stage where it significantly impacts the labor market. On the other hand, Structural Unemployment Theory also indicates that reducing population growth may not directly address skills mismatch and structural issues in the labor market. Furthermore, Endogenous Growth Theory's emphasis on human capital and technological progress suggests that other factors may play a more substantial role in influencing employment outcomes.

In conclusion, the lack of statistical significance for the population growth variable implies that other economic, social, and policy-related factors are more influential in shaping unemployment in Nigeria. In view of this, targeted policy interventions focusing on structural issues, investment in high-employment sectors, and fostering an environment conducive to job creation are essential for addressing unemployment effectively.

Overall, the results underscore the need for targeted policy interventions that address structural issues in the labor market, promote investment in sectors with high employment potential, and foster an environment conducive to job creation and economic growth. Policymakers should focus on comprehensive strategies that consider both demand-side and supply-side factors affecting employment outcomes.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The regression results indicate that within the study period (1980-2022), the reduction in population growth does not exhibit a statistically significant impact on unemployment rate in Nigeria. The coefficient for population growth is small and lacks statistical significance, suggesting that changes in population growth alone may not be a major determinant of unemployment in the country during this period. This implies that the intricate dynamics of the labor market and unemployment in Nigeria are influenced by factors beyond population growth such as educational attainment and skills mismatch, government expenditure and GDP growth rate.

Therefore, addressing unemployment in Nigeria requires a multifaceted strategy that considers the complexities of the labor market, structural issues, and the evolving demographic landscape. This study recommends that policymakers need to adopt a holistic approach that addresses multiple factors simultaneously, including education reform, skills development programs, targeted economic policies, and initiatives to stimulate job creation in key sectors. Furthermore, policy interventions should be tailored to the specific challenges faced by the Nigerian workforce, with a focus on long-term sustainable development and inclusive growth. The specific recommendations are seen below:

Address structural unemployment through skill development programs. The Federal Ministry of Education and National Board for Technical Education (NBTE) should, as a matter of urgency, implement targeted skill development programs aligned with labor market demands by increasing funding for vocational and technical training institutions and updating their curricula. Collaboration with private sector companies to offer apprenticeships and internships will also bridge the skills gap.

Enhance educational attainment that align with market needs. The Federal Ministry of Education and State Ministries of Education should improve education quality by investing in teacher training, updating educational materials, and enhancing infrastructure with the view to integrate STEM education at all levels to prepare students for the evolving job market, and ensure educational institutions maintain strong industry ties to keep the curriculum relevant.

Increase government expenditure on job creation initiatives. The Federal Ministry of Finance, Budget, and National Planning, and National Directorate of Employment (NDE) should allocate significant portions of the national budget to job creation initiatives, especially in high-growth sectors like technology, agriculture, and renewable energy. The NDE should lead entrepreneurship programmes providing training, mentorship, and funding to young entrepreneurs.

Implement policies to boost economic growth and employment. The Central Bank of Nigeria (CBN) and Federal Ministry of Industry, Trade, and Investment should introduce monetary

policies promoting economic stability and growth, such as lower interest rates and increased access to credit for SMEs. The Ministry of Industry should create an enabling environment for businesses by reducing bureaucratic red tape and providing incentives for local and foreign investments.

Foster Public-Private Partnerships (PPP) for job creation. The Nigerian Investment Promotion Commission (NIPC) and Nigerian Employers' Consultative Association (NECA) should encourage government-private sector partnerships to create job opportunities. The NIPC should attract foreign investments that lead to job creation, while NECA can facilitate dialogue between employers and policymakers to ensure labor market needs are met.

Support rural development to mitigate urban unemployment. The Federal Ministry of Agriculture and Rural Development and National Agency for the Great Green Wall (NAGGW) should invest in rural infrastructure and agricultural development to reduce rural-urban migration. Initiatives such as improving irrigation systems, providing agricultural subsidies, and supporting agribusinesses can create employment opportunities in rural areas, reducing strain on urban job markets.

Promote technology and innovation to drive job creation. The Federal Ministry of Communications and Digital Economy and National Information Technology Development Agency (NITDA) should foster a digital economy by investing in technology infrastructure and encouraging innovation. Support startups and tech hubs through grants and tax incentives, and promote digital literacy programs to equip the workforce with necessary skills for the technology-driven job market.

By targeting these specific agencies and ensuring their active involvement, policymakers can implement more effective strategies to address the multifaceted causes of unemployment in Nigeria.

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